Climate Risk

Can Data Science Help Us Better Understand and Predict Hazards, Exposure and Vulnerability?

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Big Role for “Big Data” and Data Science:

- Ultra-high-resolution climate simulations
- Analysis of massive climate datasets
- Data assimilation of climate observations
- Data assimilation of emerging, unstructured data streams (social, search, geolocation)
Climate Risk

IPCC WGII, 2014

Diagram showing the relationship between climate, socioeconomic processes, emissions and land-use change, and climate risk, including concepts of hazards, vulnerability, and exposure.

- **Climate**: Natural Variability, Anthropogenic Climate Change
- **Socioeconomic Processes**: Socioeconomic Pathways, Adaptation and Mitigation Actions, Governance
- **Emissions and Land-use Change**: IMPACTS
- **Risk**: Hazards, Vulnerability, Exposure

The diagram illustrates the interconnectedness of these factors in assessing and managing climate risk.
Data analysis of massive climate model simulations

~3 Petabytes of data from hundreds of realizations of dozens of climate models developed at dozens of national centers around the world

BUT:
lack of “online” analysis capacity substantially limits fraction of data that are analyzed
Data assimilation of climate observations

Welcome to Climate.Data.gov!
March 19, 2014

In this new and pilot-stage of Climate.Data.gov, you will find resources to help companies, communities, and citizens understand and prepare for the impacts of coastal flooding and sea level rise. Over time, you’ll find more datasets, web services, and tools, as well as other themes such as the vulnerability of the food supply and the threats to human health from climate change.

Check out the data catalog to browse relevant datasets. If you are looking for a streamlined list, the resources page features datasets and services on coastal vulnerability.

Looking for information to help you and your community plan for coastal flooding and sea level rise? Please review our list of tools, which will grow over time.

If you are a problem-solver or entrepreneur who wants to take on a big challenge to help communities and citizens be more aware and prepared for climate change, check out the challenges.
“Crowdsourcing” hyper-local weather conditions

The OpenWeather smartphone app collects temperature, humidity and air pressure information from users around the world to track weather conditions in real time. Right now, the app is only available on Android smartphones.

*Image credit: American Geophysical Union.*
Unstructured social, search and geolocation data can revolutionize vulnerability and exposure assessment.

Performance of Social Network Sensors During Hurricane Sandy

Yury Kryvasheyeu¹, Haohui Chen¹, Esteban Moro²,³, Pascal Van Hentenryck¹,⁴, and Manuel Cebrian¹

Figure 3 Cumulative distribution functions (diurnal oscillations, or steps in cumulative representation, are smoothed out by Gaussian kernel density estimation with 8-hour bandwidth) of messages for a random control group and its sensor group (both of 25,000 users). The sensor group has a consistent lead-time over the control group. The inset shows a histogram of daily messages with significantly higher absolute level of activity for sensor users.

http://arxiv.org/abs/1402.2482
Vulnerability information from “Internet of Things”